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A systematic review of questionnaires used on oral health knowledge, attitude, and practice in 12-year-olds

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Review Article

Abstract

BACKGROUND AND AIM: National oral health knowledge, attitude, and practice (KAP) data among 12-year-old children need nation-wide programs to help promote oral health. In most countries, oral epidemiologic data are collected by self-administered structured questionnaires. The aim of this study was to undertake a systematic review of the existing literature about questionnaires used for analyzing the oral health knowledge, attitude, and behavior profile of the 12-year-old children.

METHODS: The search was conducted in PubMed and Google Scholar search engines**.** The Medical Subject Heading (MeSH) search was performed applying singularly and by combining the following terms retrieved from the MeSH browser provided by MEDLINE: "Knowledge, awareness, attitude, practice, behavior, 12-year-old children, oral health."

RESULTS: Of 176 records found, 29 evaluated oral health KAP in 12-year-old children by structured questionnaires. The most important questions on knowledge (23 of 29 questionnaires) included some items which are focused on the importance of preserving natural teeth, effects of brushing, and sweets and soft drinks on the dentition. The most common questions on practice (28 questionnaires) were brushing activity and dental visits. The attitudes were evaluated by questions about fear of dental treatment, opinion about dentists and dental care (10 questionnaires).

CONCLUSION: Considering differences in the available questionnaires showed that despite the importance of promotion of oral health by increasing knowledge, and improving attitudes and practice in 12-year-old children, more work is needed to form a standard questionnaire.

KEYWORDS: Oral Health; Knowledge; Attitude; Behavior; Review

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Dental caries and gum disease are the most common diseases in human populations that affecting over 80% of school children in some countries.[1,2] During the past decades, the common consensus from many reports was that prevalence of dental caries in children and adolescents had declined significantly in developed countries in contrast to developing countries.[3,4] There are, however, recent studies that clearly indicates a marked increase in the prevalence of dental caries in many countries. It appears that the main reasons for this global increase are unhealthy dietary habits, and inadequate oral hygiene practices.[5]

To prevent and control oral diseases, improvements in knowledge, attitudes, and behaviors related to oral health among school children have been recommended by the World Health Organization (WHO).[6] The

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12-year age group is especially important as it is the age at which all the permanent teeth, except the third molars, have erupted. Therefore, this age has been selected as the global monitoring age for caries for international comparisons and future planning of oral health programs.[7]

To promotion of the oral health, the planning and assessing of school-based oral health programs would be needed. For planning these programs, analysis of the oral health situation including information on oral health knowledge, attitude, and practice (KAP), would be essential.[8] Despite the high rate of dental caries in 12-year-old,[9] socio-epidemiologic data about oral health behavior of children are not available at national level. Therefore, KAP studies to collect such information and the assessment of oral health in children and adolescents are considered to be an essential prerequisite.

In most countries, oral epidemiologic data about KAP were collected by self-administered structured questionnaires.[6,8] In some studies, the construction of questionnaires has been based on experiences gained from surveys carried out by the WHO. These questionnaires vary widely in terms of the number of items and format of questions and responses. Therefore, there is a need for a standard questionnaire. The aim of this study was to carry out a systematic review of the existing literature on these questionnaires. This report is a part of a study with the aim of designing an appropriate questionnaire for the analysis of oral health behavior profile of 12-year-old children.

Methods

A computerized search was conducted using PubMed, Google Scholar between January 01, 2002, and August 31, 2013. The Medline search uses a complex search strategy, including Medical Subject Heading (MeSH). After initial evaluations, main keywords (knowledge, attitude, behavior, practice, oral health, questionnaire, and 12-year-old children) in both singular and combined types were determined by MESH system. "OR" between the synonyms and "AND" between the main keywords were used to import the keyword combinations in the reviewed sites.

In addition, a search was conducted on Google Scholar with the same keywords and relevant studies cited in the reference lists of the selected papers were considered. First, the exclusion criteria of the irrelevant articles were applied in the three steps of title, abstract, and the full-text. The full-texts of all the related studies were assessed by one author. If there was any doubt or question, there was consultation with corresponding author/epidemiologist and statistical advisor. After that all the full-texts of the relevant articles were reviewed carefully, and the references of all selected articles were reviewed to identify any additional studies. A guideline for conducting a KAP study was used to evaluate the quality of articles.[10] Based on this guideline, steps in the preparation of a KAP study are: (1) domain identification, (2) question preparation, and (3) validation of questions. Validation of questions should be aimed at assessing their ease of comprehension, relevance to their intended topics, effectiveness in providing useful information, and the degree to which the questions are interpreted and understood by different individuals.

Unpublished studies and abstracts were not considered for inclusion in this systematic review. Full-text of three studies was not available and in spite of attempts to contact the authors, this not achieved, so these studies were excluded from the study. Finally, 29 out of 496 articles remained at the end of these steps (Figure 1).

All items in knowledge, practice, and attitudes areas were determined, and the number of items and format of questions and responses were reviewed. Finally, the questions were categorized based on different items in three areas of knowledge, practice or behavior, and attitudes.

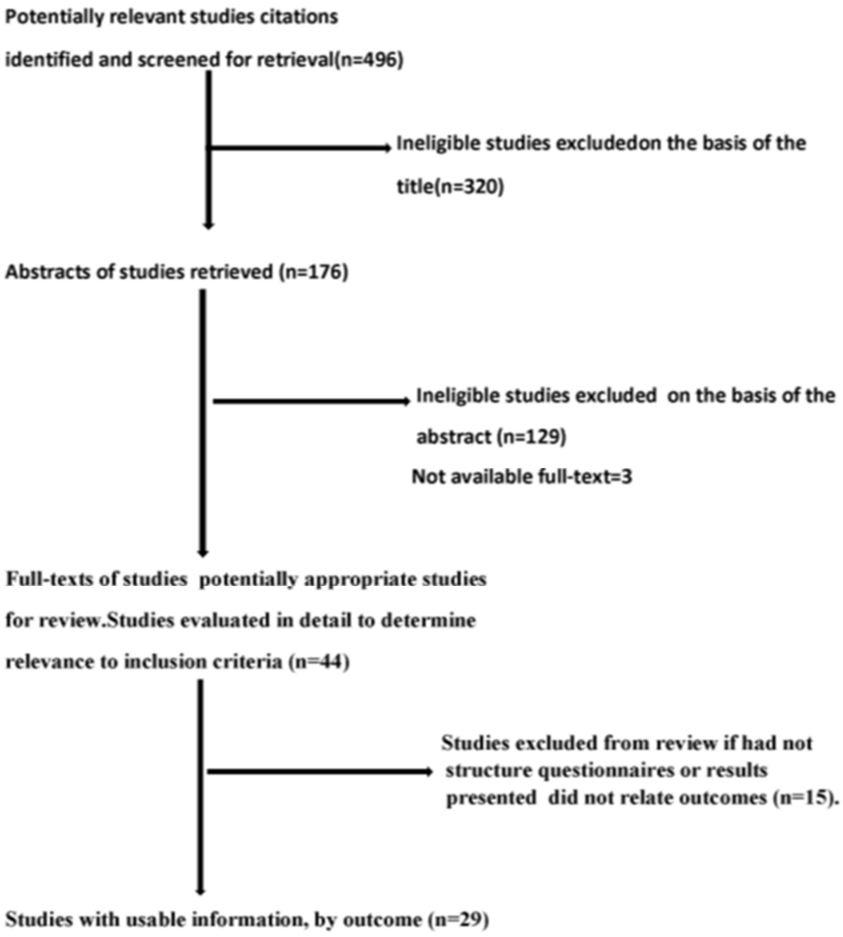

Figure 1. Flow diagram of studies of knowledge, attitude, and practice on oral health among 12-year-old children consisted for inclusion

Results

First, we identified 496 citations meeting our search criteria. From these articles, 29 evaluated oral health in 12-year-old children by structured questionnaires.[3,4,6,8,11-35] Table 1 shows information about the name of the first author, country, year of publication, the age of subjects, and sample size of each study. In the most studies, the survey instrument was an administered pre-tested questionnaire. Knowledge questions have been asked in 23 of 29 articles. The characteristics of questionnaires have been shown by figure 2. Figure 2 indicates that only 48.3% of articles have reported on the validity and reliability of structured questionnaires, and the number and form of questions and responses were highly variable.

Knowledge area

The most important questions on knowledge included items on the importance of preserving natural teeth, effects of brushing and using fluoridated toothpaste, the meaning of bleeding gums and caries and how to protect against it, and the effects of sweets and soft drinks on the dentition. Table 2 shows the importance of keeping natural teeth of knowledge area (7 different formats) and knowledge of sweet and soft drink effects on the dentition (3 different formats).

One important and common aspect of knowledge questions was about the role of fluoride in oral health, which were addressed in five formats, but the dominant one was: "The use of fluoride prevents tooth decay; true/false/do not know."

Table 1. Characteristics of studies included in review

First author	Country	Age (year)	Sample size (n)
Rajab et al.[22]	Jordan	6-16	1556
de Almeida et al.[11]	Portugal	6 and 12	800 (12-year-old)
Zhu et al.[4]	China	12-18	4400
Varenne et al.[31]	Burkina Faso	12	505
Al-Omiri et al.[35]	North Jordan	10-16	557
Ahmed et al.[34]	Iraq	12	392
Grewal and Kaur[15]	India	11-16	200
Singh[17]	India	5-12	377
Smyth et al.[12]	Spain	12	1105
Harikiran et al.[8]	India	11-12	212
Kawamura et al.[24]	Japan	4-12	1584
Ouma and Martha[32]	Soweto	6-12	336
Petersen et al.[21]	Chin	11-15	2662
Jürgensen and Petersen[28]	Laos	12	621
Granville-Garcia et al.[27]	Brazil	10-19	679
Hysi et al.[25]	Albania	12	372
Lian et al.[23]	Sarawak	12	209
Prasad et al.[30]	India	12-15	652
Shenoy and Sequeira[18]	India	12-13	415
Diwan et al.[13]	India	3-19	798
Vakani et al.[16]	Pakistan	11-12	300
Gathecha et al.[26]	Kenya	12	639
Haleem et al.[14]	Pakistan	10-12	1517
Mehta and Kaur[6]	India	12	440
Mafuvadze et al.[33]	Zimbabwe	12	205
Prasai et al.[19]	Nepal	5-16	361
Sharada et al.[20]	India	12-13	514
de Silva-Sanigorski et al.[29]	Australia	5-6 and 11-12	377
Suprabha et al.[3]	India	11-13	858

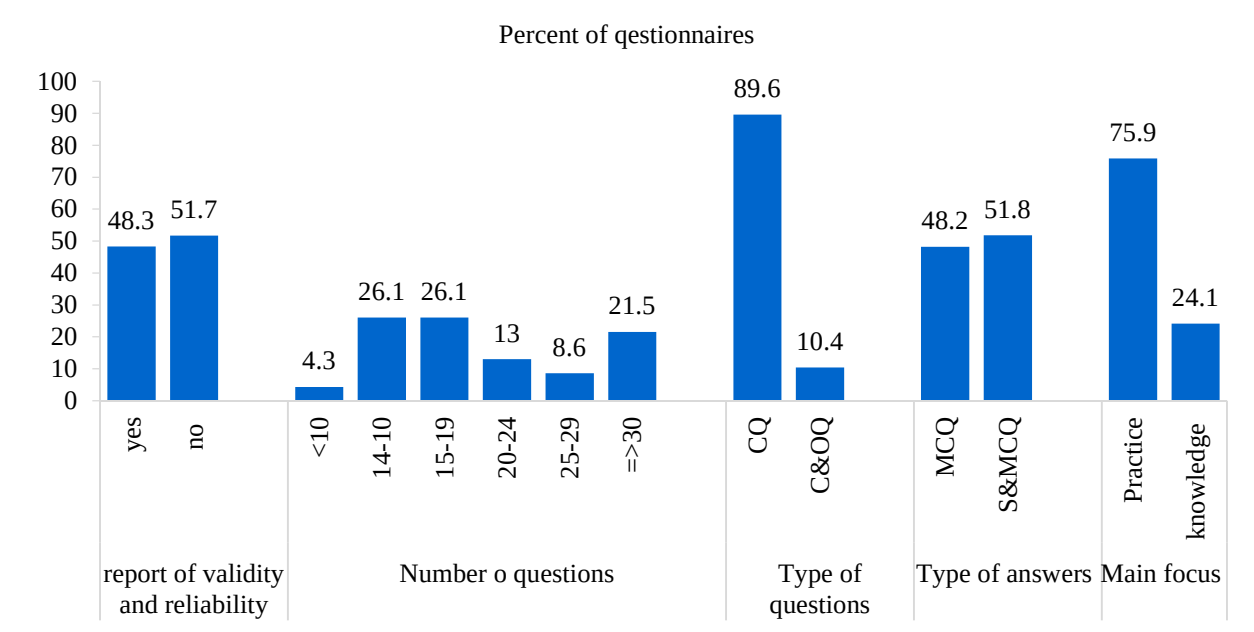

Figure 2. The characteristics of questionnaires

CQ: Closed question; C and OQ: Closed and open question; MCQ: Multiple choice question; S and MCQ: Combination short and multiple choice question

Table 2. The item "importance of keeping natural teeth" and "effects of sweets and soft drinks on the dentition" of knowledge questions

Questions	Questionnaires
1. Keeping natural teeth is important for general well-being	India-Mangalore[3]
a. True	Mofolo, Soweto[31]
b. False	India-Mangalore[17]
c. Do not know	
2. Do you think keeping your mouth clean and healthy is good for health?	Panchkula, India[6]
a. Yes	China[4]
b. No	Karachi[15]
c. Do not know	India[16]
3. General body health has a relationship to oral health and dental diseases	Kuching, Sarawak[22]
a. True	Jordan[34]
b. False	
4. Keeping natural teeth is not that important	India-Bangalore[8]
a. Agree	Burkina Faso-Africa[30]
b. Disagree	
c. Do not know	
5. Teeth are an important part of your body	Panchkula, India[6]
a. Agree	Japan[23]
b. Disagree	
c. Do not know	
6. Natural teeth are better than false teeth	India-Mangalore[3]
a. True	
b. False	
c. Do not know	
7. Keeping natural teeth is not that important	Burkina Faso-Africa[30]
a. Agree	
b. Disagree	
c. Do not know	
8. Sugar causes tooth decay	India-Mangalore[3]
a. A lot	India-Mangalore[17]
b. Quite a lot	Kuching, Sarawak[22]
c. Not much	Zimbabwe[32]
d. Not at all	Nepal[18]
	India[19]
	Jordan[34]
9. Eating and drinking sweet food does not cause decay	India-Mangalore[3]
a. True	India-Bangalore[8]
b. False	Panchkula, India[6]
c. Do not know	
10. Do you know which of the following food items is/are the main cause of tooth decay?	Karachi[15]
a. Sweets/chocolates/biscuits/cakes/chips/waffers	India[16]
b. Fresh fruits	Australia[28]
c. Raw vegetables	
d. Do not know	

Attitude area

Attitude questions had been asked by 10 articles. The attitudes toward oral health have been evaluated by questions on the importance of natural teeth (Table 3), fear of dental treatment, feelings regarding the treatment, thoughts about involvement in the dental treatment, opinion about and attitudes toward dentists and dental care and regular dental visits.

Questions on the importance of natural teeth were asked in several ways. The most common questions in this item were:

1. Decay makes my teeth look bad:
a. Fully agree
b. Agree
c. Disagree

Table 3. The items of attitude question about importance of natural teeth

Questions	Questionnaires
1. It is important to take care of my teeth a. Fully agree b. Agree c. Disagree d. Fully disagree e. No opinion	Spain[11]
2. You care about your teeth as much as any part of your body a. Yes/no	Jordan[34]
3. Decay makes my teeth look bad a. Fully agree b. Agree c. Disagree d. Fully disagree e. No opinion	India-Bangalore[8] Spain[11] India[16] 13-Jordan[34]
4. Dental problems can cause other health problems a. Fully agree b. Agree c. Disagree d. Fully disagree e. No opinion	Japan[23]
5. Dental problem can be serious a. Fully agree b. Agree c. Disagree d. Fully disagree e. No opinion	Japan[23]
6. Dental disease is less important than other health problems a. Fully agree b. Agree c. Disagree d. Fully disagree e. No opinion	Japan[23]
7. It is natural for people to lose all their teeth in old age a. Fully agree b. Agree c. Disagree d. Fully disagree e. No opinion	Japan[23]
8. Milk teeth are not important because they fall out soon a. Fully agree b. Agree c. Disagree d. Fully disagree e. No opinion	Japan[23]
9. I am able to prevent my teeth from decaying a. Fully agree b. Agree c. Disagree d. Fully disagree e. No opinion	Japan[23]

d. Fully disagree
e. No opinion.

Practice area

The practice of 12-year-old children has been assessed by 28 articles. The most common questions about the practice were tooth brushing habits (TBH) (such as frequency, duration, and brushing aides) (Table 4), the frequency of sugar consumption and drinking soft drinks, and dental visits (such as regularity, reasons behind the visits and the effect of pain on the first visit). Questions in some of the items had almost the same form. Table 3 shows the item TBH of practice questions. In this item although questions were asked almost the same format, but the number of questions was different. In some studies, the details of brushing activity such as time of brushing, type of toothpaste, and frequency in a change of toothbrush were determined. The most common question in this item was:

2. How often do you brush your teeth?
a. Less than once a week
b. Once a week
c. 2-3 times a week
d. Twice or more a day
Every day do not know/no answer.

Table 4. The item of brushing activity of practice questions

Questions	Questionnaires
1. How often you brush your teeth?	China[4]
a. Less than once a week	Panchkula, India[6]
b. Once a week	India-Bangalore[8]
c. 2-3 times a week	Uttarakhand-India[12]
d. Every day	Amristar, India[14]
e. Twice or more a day	Kuching, Sarawak[22]
f. Do not know/no answer	Albania[24]
	Kenya[25]
	Laos[27]
	Australia[28]
	Mofolo, Soweto[31]
	Jordan[34]
2. How many times you brush daily?	India-Mangalore[3]
a. Less than once per day	Portugal[10]
b. Once per day	Pakistan[13]
c. Twice per day	Karachi[15]
d. More than twice per day	India[16]
	India-Mangalore[17]
	Nepal[18]
	Brazil[26]
	Zimbabwe[32]
	Iraq[33]
3. The last time I brushed my teeth was	Spain[11]
a. Today/yesterday/day	
b. Before yesterday/more than 2 days ago	
4. Type of brush	India-Mangalore[3]
a. Plastic toothbrush	Uttarakhand-India[12]
b. Charcoal/chew sticks	Thiruchengode-India[29]
c. Miswak/wooden	
d. Plastic toothpicks/finger/brush	
e. Finger/do not know/no	

Table 4. The item of brushing activity of practice questions (Continue)

Questions	Questionnaires
5. Which of the following do you use for cleaning your teeth? a. Toothbrush b. Finger c. Chew stick/miswak	India-Mangalore[3] Panchkula- India[6] India-Bangalore[8] Uttarakhand-India[12] Pakistan[13] Amristar, India[14] India[16] Nepal[18] Kenya[25] Mofolo, Soweto[31] Jordan[34]
6. Type of toothpaste a.Fluoridated b. Non-fluoridated c.Do not know	India-Mangalore[3] China[4] India-Bangalore[8] Amristar, India[14]
Started brushing teeth: Before schooling when attending primary school after completing primary school	China[4] Mofolo, Soweto[31]
7. Rinse your mouth after each meal a. Yes b. No	India[16] India-Mangalore[17] Thiruchengode-India[29]
8. Time of brushing a. Morning only b. Morning and night c. Night only d. After every meals	India-Mangalore[3] China[4] Jordan[34]
9. When will you change your toothbrush? a. 1-3 months b. 4-6months c. 1 year d. Above/after bristles e. Splayed/do not know	India-Mangalore[3] India[16] India-Mangalore[17] Thiruchengode-India[29]
10. Do you use any other oral hygiene aids? a. Dental floss b. Interdental brush c. Toothpicks d. Mouthwash e. None f. Do not know	Amristar, India[14] India[16]

Discussion

Based on strong evidence, in developing countries, oral hygiene is one of the main health considerations.[4,36] Therefore, repeated KAP studies is highly recommended to monitor trends; however, a valid and culturally adapted questionnaire is one of the main pre-requisites. This systematic review showed that despite the importance of the 12-year age group, there is not a standardized questionnaire for evaluating oral health knowledge, attitude, and behavior in these children.

In the majority of studies (51.7%), there was not a report on validity and reliability of questionnaires. Furthermore, these tools vary

widely in terms of the number of items and format of questions and responses. However, there was the high similarity between the content of questionnaires. The most similarity was between practice questions, and the least one was between attitude questions. The most common format of questions was a combination of multiple choices and yes-no answers, and the most of the questions were asked in closed-ended format. The number of questions had a wide range. The most common number of questions was 10-14 and 15-19. Perhaps the reason is some studies that have assessed only one or two areas. It seems that an appropriate and comprehensive questionnaire that evaluate KAP (different domains such as brushing habits, diet, and dental visits), should contain 30 questions. The further questions could be boring for children, and they may not respond properly and accurately to all questions and with fewer questions may not adequately assess all aspects of KAP on oral health. In most studies, knowledge questions were asked before the others,[16,17] but in some studies, there was not a regular sequence to ask questions.[32] It seems reasonable that the level of knowledge was measured first and then the practice and attitude on oral health.

In a suitable questionnaire, the knowledge questions should be included some items on the effects of sweets and soft drinks on the dentition, the importance of preserving natural teeth, the effect of brushing, using fluoridated toothpaste, and the importance of flossing. It is better to response the knowledge questions with both short (yes or no or true or false) and multiple choice forms depending on the type of question. The results of this review showed that despite the importance of flossing to prevent tooth decay, only a limited number of studies have asked about knowledge on using dental floss. Furthermore, in some of studies, knowledge and attitude questions were mixed together without logical procedure.[32]

As mentioned earlier in this review, knowledge questions were asked in several ways. The most important questions were about knowledge of diet effect on tooth caries. It seems that the best form of question was:

3. Do you know which of the following food items is/are the main cause of tooth decay?

a. Sweets/chocolates/biscuits/cakes/chips/wafers
b. Fresh fruits
c. Raw vegetables
d. Do not know

Although this form of the question was only used by three studies, but because the answers were multiple choice and include a variety of snacks, it appears to be more acceptable for children.

It obvious that an appropriate questionnaire should be included more questions with multiple choice answers in the area of practice. Because this area measures different domains such as brushing habits, the frequency of sugar consumption and drinking soft drinks, and dental visits. In this systematic review, some of the articles only evaluated the practice of children (7 article), and the most of other studies have focused on the practice of oral health in comparison with knowledge and attitude. It seems that the reason of this emphasis on practice is that most of the studies have been shown that the practice is not fully explained by knowledge and attitude, and the oral healthcare practice is influenced by socioeconomic factors, especially mother's education level and location where the children live (urban and rural).[3,12] In this review, the most studies measured the TBH with questions about the frequency, duration, and brushing aides; in only two articles type of cleaning of teeth and type of brushing have been evaluated. The most important question about TBH was about the correct number of brushing. It seems that the best form of question about this subject was:

4. How often do you brush your teeth? (13 studies)

a. Less than once a week
b. Once a week
c. 2-3 times a week
d. Every day
e. Twice or more a day
f. Do not know/no answer.

Answers of this question were more complete and included a wider range of time than other forms of questions.

Furthermore, in a perfect questionnaire, the attitude questions should be included items about the importance of natural teeth, and fear of dental treatment and opinions about and attitudes toward dentists and dental care. It is better to response these questions as three Likert-scale questions (agree, disagree, no opinion). In this review, the attitudes of 12-year-old have been evaluated in 10 articles. It seems that although attitude about fear of the dentist and experience on a dental visit could be effective on oral health practice, less emphasis has been placed on this topic. This, may be due to the fact that, oral health attitude does not necessarily relate to better health behavior.[12,13]

Although there are studies in Portugal, Japan, and Spain, but most studies have been conducted in developing countries. However, it can be due to effective networking within the schools, and appropriate and comprehensive school-based educational programs in developed countries. In developing countries, it appears that even in a community, for example, India that many studies have been conducted about this subject,[3,6,8,17,19] there was not a standard questionnaire and researchers collected data by self-administered structured questionnaires.

According to the above stated, the importance of knowledge on oral health and the role of improving knowledge as a prerequisite for oral health perception and behavior, a standard questionnaire, particularly in the area of knowledge and attitude, is an urgent need. This questionnaire must be comprehensive and should include different items in each area, but it appears that this issue has not been considered by researchers even in the different area of one country.

Therefore, it is recommended that further countrywide intensive studies should be carried out to compare national and international oral health knowledge, practice, and attitude in this age group. These studies should use an appropriate and accurate questionnaire-based on the culture of their country. Results of this systematic review can help researchers to select the best version of questions in each item and to design an appropriate questionnaire for this group.

Before drawing any conclusion, limitations of this study are worth mentioning. In this study, there was the lack of access to some of the full-text articles and in spite of attempts to contact the authors, this not achieved, so these studies were excluded from the study. Moreover, in some full-text articles, the questionnaires were not available, and the results were presented in the tables. We tried to contact the authors and get the questionnaires but did not receive a response, so the questions were extracted from the tables. Another limitation of this study was that we just searched for studies in English, and we did not have access to non-English studies.

Conclusion

It seems that, despite the importance of promotion of oral health by improving KAP in 12-year-old children, there is not a standard questionnaire. Therefore, it is absolutely necessary to design a standard questionnaire to evaluate KAP in this age group of children.

Conflict of Interests

Authors have no conflict of interest.

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